

Project File Number

ER-WAG7-76

Functional File Number

INEL-95/139

## ENGINEERING DESIGN FILE

Project/Task WAG 7 Data Compilation  
Tasks

Subtask SDA Biotic Data  
Compilation

EDF 1 of 37  
Page

### TITLE: SDA biotic data compilation

#### SUMMARY

The summary briefly defines the problem or activity to be addressed in the EDF, gives a summary of the activities performed in addressing the problem and states the conclusions, recommendations, or results arrived at from this task.

This EDF documents a review/survey of biotic data specific to the RWMC Subsurface Disposal Area (SDA). The purpose of the review was to compile site specific data values for previously defined and newly identified parameters supporting WAG 7 human and ecological risk assessment modeling.

These parameters include:

Insect and animal burrow depths, densities, and volumes

Plant root and water extraction depths

Plant root density and mass

Plant shoot mass

Plant cover and density

Growing season length and variability

Plant life span

Plant contaminant uptake factors

Animal contaminant bioaccumulation factors

Wildlife diet, body weight, home range, exposure duration and ingestion rates.

The scope and process covered in this EDF are detailed under Tasks 1 and 2 in the March 3, 1995 letter NLH-01-95 (attachment 1). The review involved distillation of RWMC/SDA related publications from previous bibliographies and compilation of actual data values published in pertinent studies. Where publications/data specific to the RWMC/SDA were not found, those applicable to the INEL in general were reviewed.

The results of this survey are presented as 1) a bibliography of the source references and 2) descriptions and data compiled for the 12 parameters (Tables 1-11).

Distribution (complete package): none

Distribution (summary page only): none

Author N. L. Hampton T. A. Bensen	Dept. Environmental Assessment Technologies	Reviewed B. Becker	Date 4/19/95	Approved	Date 5/3/95
		Review	Date	Approval	Date

**Table 1.** Summary of SDA specific data sources.

Table #	Parameter	Modifying Information	Source <sup>a</sup>			Supporting Data Requirements	Comments
			SDA/RWMC	INEL	Other <sup>b</sup>		
2	Insect and Animal Burrow Depths	None	Blom 1990 Laundre' 1990 Reynolds & Laundre' 1988	Blom et al 1991 Laundre' 1989a Mullican & Keller 1987 Reynold & Wakkinen 1987		Species presence at SDA Species habitat preference Soil profile disturbance history	
3	Insect and Animal Burrow Densities	None	Bargelt et al. 1992 Binda 1981 Blom 1991	Reynolds & Laundre' 1988		Species presence at SDA Species habitat preference Soil profile disturbance history	
4	Insect and Animal Burrow Volumes	None	Arthur & Markham 1983 Binda 1981 Laundre' 1989a Laundre' 1989b	Reynolds & Laundre' 1988 Reynolds & Wakkinen 1987		Species presence at SDA Species habitat preference Soil profile disturbance history	
5	Plant Root Depth/Water Extraction Depth	None	Abbott et al. 1991 Anderson et al. 1993 Bargelt et al. 1992 Binda 1981 Reynolds 1990a Reynolds 1990b Reynolds & Fraley 1989			Soil profile disturbance history	
6	Plant Root Density/Root Mass	None		Reynolds 1990a		Species presence at SDA Soil profile disturbance history	
7	Mass of Plant Shoots	Wet or dry mass	Arthur 1982 Bargelt et al. 1992			Species presence at SDA Soil profile disturbance history	
8	Fraction of Plant Cover/Plant Densities	None	Anderson 1991 Anderson & Shumar 1989	Anderson & Holte 1981 Anderson 1986 Anderson & Marlette 1986 Anderson & Inouye 1988 French & Mitchell 1983		Plant communities present at the SDA/RWMC	
	Length of Growing Season and Variability Over Time	None	Anderson and Shumar 1989	Anderson & Inouye 1988			Interpretation required.
	Plant Average Life Span	None		Anderson & Marlette 1986 French & Mitchell 1983			No INEL specific data were located.
9	Plant Uptake Coefficients	Plant and contaminant specific, on wet or dry mass basis	Anderson et al. 1991* Arthur 1982 Arthur & Markham 1983 Bargelt et al. 1992* Durfee et al. 1990* Durfee et al. 1991* Millard et al. 1983* Reyes et al. 1986* Reyes et al. 1987* Reyes et al. 1990* Sorensen & Koeppen 1992* Tkachyk et al. 1988*	Anderson et al. 1987		Soil contaminant concentration associated with plant samples Data for individual plants	These values are preliminary pending verification of soil concentrations and interpretation of composite plant sample data.  * These sources have been reviewed, but data were not compiled for use here.
10	Bioaccumulation Factors		Arthur 1982 Arthur & Janke 1985 Arthur & Janke 1986 Arthur et al. 1987 Arthur & Markham 1983 Connelly & Markham 1983 Markham & Halford 1982 Van Horn 1995	Halford et al. 1981 Env Monit Report 1976 Markham & Halford 1985 Markham et al. 1980a Markham et al. 1982 Markham et al. 1988	Hoff 1987	Soil contaminant concentrations	These values are preliminary.

**Table 1.** (continued).

Table #	Parameter	Modifying Information	Source <sup>a</sup>			Supporting Data Requirements	Comments
			SDA/RWMC	INEL	Other <sup>b</sup>		
11	Wildlife Biology and Habitat • Diet • Body weight • Home Range • Exposure Duration • Ingestion Rates		Boone 1990 (14) Koehler 1988 (14, 15, 16, 17, 18, 19, 20)	Arthur & Gates 1988 (7, 10) Connelly & Markham 1983 (1) Connelly et al. 1988 (1) Groves & Keller 1986 (2) Howe & Flake 1988 (3) Janke & Arthur 1985 (4) Knick 1986 (5) Laundre' 1979 (6) Laundre' 1984 (7) Laundre' & Keller 1981 (6) Reynolds 1984 (7) Reynolds & Rich 1978 (5) Watson 1986 (8) Woodruff & Keller 1982 (9) Woodruff 1977 (6) MacCracken & Hansen 1984 (10, 11) Markham & Trost 1986 (3) Petersen & Best 1986 (12, 13)	Baes 1984 <b>Beyer et al. 1984</b> <b>Burt &amp; Grossenheider 1980</b> <b>Dunning 1993</b> <b>Hoover &amp; Wills 1986</b> <b>Travis &amp; Arms 1988</b>		(1) Sage grouse (2) Small mammals (3) Mourning doves (4) Cottontail rabbit (5) Bobcat (6) Coyote (7) Pronghorn (8) Sage thrasher (9) Rough-legged hawk (10) Blacktailed jackrabbits (11) Nuttall cottontail (12) Sage sparrow (13) Brewer's sparrow (14) Deer mouse (15) Townsend's ground squirrel (16) Ord's kangaroo rat (17) Montane vole (18) Great Basin pocket mouse (19) Least chipmunk (20) Northern grasshopper mouse

a. Sources in bold indicate those from which data were compiled.

b. Sources listed as SDA or INEL were given primary consideration for use in this data compilation effort.

**Table 2.** Animal and insect burrow depths.

Animal or Insect	Depth (cm)		Reference
	Average	Maximum	
Least Chipmunk ( <i>Tamias minimus</i> )	17.5	31	Laundre' 1989a
Sagebrush vole ( <i>Lemmiscus curtatus</i> )	12.5	20.3	Mullican and Keller 1987
Deer mouse ( <i>Peromyscus maniculatus</i> )	24	50	Reynolds and Wakkinen 1987
Montane vole ( <i>Microtus montanus</i> )	23	155	Reynolds and Wakkinen 1987
Ord's kangaroo rat ( <i>Dipodomys ordii</i> )	34	69	Reynolds and Wakkinen 1987
Townsend's Ground Squirrel ( <i>Spermophilus townsendii</i> )	Shallow Deep	29 128	Reynolds and Wakkinen 1987

References other than those cited were reviewed for this data, but found to be not applicable. The Reynolds and Wakkinen 1987 study was cited specifically as conducted at an undisturbed location while it was not stated in the other two studies that the study sites were undisturbed, but it is assumed they were based on site descriptions in the papers. While burrow depth is reported here for the least chipmunk and sagebrush vole, it is noted that these species have been reported burrowing primarily at the perimeter of the SDA, and Townsend's ground squirrel and the sagebrush vole are far less common on the SDA than the other species (Koehler, 1988). Therefore, burrow depths for the deer mouse, montane vole, and Ord's kangaroo rat should be used preferentially when assessing current SDA conditions.

**Table 3.** Animal and insect burrow densities.

Seed Harvesting Ant ( <i>Pogonomyrmex salinus</i> )			
Plant Community (Genus and species)	Plant Community (Common Name)	Average number of nests per plant community	Reference
<i>Agropyron cristatum</i>	Crested wheatgrass	13.3	Blom et al. 1991
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming big sagebrush	35.6	Blom et al. 1991
<i>Artemisia tripartita</i>	Three-tipped sagebrush	11.4	Blom et al. 1991
<i>Oryzopsis hymenoides</i> , <i>Chrysothamnus viscidiflorus</i> , <i>Opuntia polyacantha</i>	Indian ricegrass, green rabbitbrush, prickly pear cactus	22.9	Blom et al. 1991
<i>Juniperus osteosperma</i>	Utah juniper	55.4	Blom et al. 1991
<i>Elymus cinereus</i>	Great Basin wildrye	0	Blom et al. 1991
<i>Ceratooides lanata</i>	Winterfat	8.8	Blom et al. 1991

Only one other reference was reviewed for animal and insect burrow density data but found to not report relevant data. No data were found for any other animal or insect burrow densities. Data presented here for the seed harvesting ant are summarized as the number of nests per plant community but data for the number of nests at a given location are also presented. The plant communities current occupying the SDA are limited to primarily crested wheatgrass with Wyoming big sagebrush surrounding the SDA. Therefore, data for these plant communities should be used preferentially.

**Table 4.** Animal and insect burrow volumes.

Burrow Volume	Maximum Volume, Disturbed Soil @ Depth	Maximum Volume, Undisturbed Soil @ Depth	Average	Maximum	Reference
Townsend's Ground Squirrel ( <i>Spermophilus townsendii</i> )	9.4 L @ 121-130 cm	11.8 L @ 131-140 cm			Reynolds and Laundre' 1988
Ord's Kangaroo Rat ( <i>Dipodomys ordii</i> )	7.3 L @ 81-90 cm	7.2 L @ 61-70 cm			Reynolds and Laundre' 1988
Deer mouse ( <i>Peromyscus maniculatus</i> )	1.3 L @ 41-50 cm	1.7 L @ 41-50 cm			Reynolds and Laundre' 1988
Montane vole ( <i>Microtus montanus</i> )	2.1 L @ 41.50 cm	1.5 L @ 51-70 cm			Reynolds and Laundre' 1988
Least Chipmunk ( <i>Tamias minimus</i> )	NA	NA	5.2 L	12.2 L	Laundre' 1989a

A total of four papers were reviewed but only data from the two references cited were used. In Reynolds & Wakkinen 1987, burrow volumes were reported in 10 cm intervals to depths dependent on the rodent species. Laundre 1989a sampled five burrows to a maximum depth of 31 cm. Data for the least chipmunk were not reported as disturbed or undisturbed. Note that volumes vary between disturbed and undisturbed soil and should be used based on the site being assessed. In addition, it is noted that the least chipmunk occurs primarily at the perimeter of the SDA and Townsend's ground squirrel is uncommon (Koehler, 1988), so data for the other small mammals should be given preference for use.

**Table 5.** Plant root and plant water extraction depths.

Plant Root Depth							
Plant Species		Maximum Depth (cm)		Maximum Lateral Spread (Spread, depth in cm)		Comments	Reference
(Common name)	(Genus and species)	Undisturbed	Disturbed				
Big sagebrush	<i>Artemisia tridentata</i>	225	200	100 @ 40			Reynolds and Fraley 1986
Green rabbitbrush	<i>Chrysothamnus vicidiflorus</i>	190	100	40 @ 80			Reynolds and Fraley 1986
Great Basin wildrye	<i>Leymus cinereus</i>	160	200	100 @ 40			Reynolds and Fraley 1986
Birdbeak	<i>Cordylanthus ramosus</i>	160	No data	80 @ near surface			Reynolds and Fraley 1986
Indian ricegrass	<i>Oryzopsis hymenoides</i>	No data	150	Not determined			Reynolds and Fraley 1986
Crested wheatgrass	<i>Agropyron desertorum</i>	No data	150	Not determined			Reynolds and Fraley 1986
Squirretail bottlebrush	<i>Elymus elymoides</i>	100	None present	40 @ 25,50,60,100			Reynolds and Fraley 1986
				Disturbed	Undisturbed		
Big sagebrush	<i>Artemisia tridentata</i>	75-100	125-150	65 @ 100	45 @ 25		Abbott et al. 1991
Green rabbitbrush	<i>Chrysothamnus vicidiflorus</i>	50-75, 100-125	50-75	30 @ 25	50 @ 100		Abbott et al. 1991
Basin wildrye	<i>Leymus cinereus</i>	50-75, 100-125	75-100	90 @ 50	90 @ 25,89,100		Abbott et al. 1991
Streambank wheatgrass	<i>Elymus lanceolatus</i>	75-100	100-125	33 @ 25	80 @ 50		Abbott et al. 1991
Crested wheatgrass	<i>Agropyron desertorum</i>	75-100	100-125	60 @ 50	60 @ 25		Abbott et al. 1991
Squirretail bottlebrush	<i>Elymus elymoides</i>	50-75	50-75	30 @ 50	60 @ 50		Abbott et al. 1991
Water Extraction Depth		Maximum Depth (cm)					
Crested wheatgrass	<i>Agropyron desertorum</i>	160					Anderson et al. 1993
Great Basin wildrye	<i>Leymus cinereus</i>	220					Anderson et al. 1993
Streambank wheatgrass	<i>Elymus lanceolatus</i>	120					Anderson et al. 1993
Wyoming Big sagebrush	<i>Artemisia tridentata wyomingensis</i>	100					Anderson et al. 1993
						This data is very dependent on how and when the species were established and the soil moisture content of the soil any given year.	

Maximum depths vary between studies for a variety of reasons, e.g., life stage of the plant being studied; which data should be used should be determined by the data user. Also, disturbed data should be used preferentially when assessing the current conditions at the SDA.

**Table 6.** Root density.

Plant Species		Maximum Density (kg/m <sup>3</sup> )	Reference
Common Name	Genus and species		
Crested Wheatgrass	<i>Agropyron desertorum (AGDE)</i>	30 @ 0-20 cm	Reynolds 1990a
Streambank Wheatgrass	<i>Elymus lanceolatus (ELLA)</i>	21 @ 0-20 cm	Reynolds 1990a
Great Basin wildrye	<i>Leymus cinereus (LECI)</i>	24 @ 0-20 cm	Reynolds 1990a
Big Sagebrush	<i>Artemisia tridentata (ARTR)</i>	17 @ 0-20 cm	Reynolds 1990a
Russian Thistle	<i>Salsola kali (SAKA)</i>	25 @ 80-100 cm	Reynolds 1990a

Reynolds 1990a was the only reference reviewed with root density data applicable to the INEL. When assessing the SDA, data for crested wheatgrass and Russian thistle are most applicable while big sagebrush is useful when considering the perimeter of the SDA.

**Table 6a.** Mean  $\pm$  SD root mass (g) and percentage of total root mass per plant for 20 cm depth increments for five semi-arid land species in southeastern Idaho (from Reynolds 1990a).

DEPTH	SPECIES						
	AGDE	ELLA	LECI	ARTR	SAKA	MT	ALL SPECIES <sup>a</sup>
	n = 5	n = 4	n = 5	n = 5	n = 3	n = 5	n = 22
	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$
0 - 20							
MASS	187.3 $\pm$ 66.9 Ab <sup>b</sup>	133.1 $\pm$ 53.2 Abc	206.6 $\pm$ 26.5 Ab	129.0 $\pm$ 35.5 Abc	117.6 $\pm$ 57.4 ABC	37.3 $\pm$ 23.0 BCd	154.9 $\pm$ 39.4 A
X	23.9 $\pm$ 4.1 Ab	21.3 $\pm$ 7.3 Ab	28.1 $\pm$ 3.3 Ab	22.0 $\pm$ 4.7 Ab	16.0 $\pm$ 7.8 ABbc	12.8 $\pm$ 6.2 Bc	22.1 $\pm$ 4.3 A
20 - 40							
MASS	81.3 $\pm$ 28.9 Bab	72.6 $\pm$ 13.2 Cabc	62.9 $\pm$ 4.4 Dbc	61.6 $\pm$ 4.3 Bbc	109.2 $\pm$ 72.4 ABa	32.9 $\pm$ 29.7 Cc	77.6 $\pm$ 19.4 C
X	10.5 $\pm$ 2.2 Ca	11.8 $\pm$ 2.1 Ba	8.6 $\pm$ 0.7 Da	10.6 $\pm$ 0.2 Ca	14.1 $\pm$ 6.8 Ba	11.3 $\pm$ 10.7 Ba	11.0 $\pm$ 2.1 B
40 - 60							
MASS	90.9 $\pm$ 26.0 Ba	77.3 $\pm$ 16.5 BCa	86.4 $\pm$ 13.6 CDa	81.2 $\pm$ 12.2 Ba	84.5 $\pm$ 19.0 Ba	37.3 $\pm$ 17.6 BCb	84.1 $\pm$ 17.4 BC
X	11.5 $\pm$ 1.7 Ca	12.5 $\pm$ 2.4 Ba	11.8 $\pm$ 2.1 Ca	13.9 $\pm$ 1.6 Ba	11.7 $\pm$ 3.2 Ba	12.6 $\pm$ 4.2 Ba	12.4 $\pm$ 0.9 B
60 - 80							
MASS	152.0 $\pm$ 37.9 ABA	125.5 $\pm$ 13.2 Aab	136.5 $\pm$ 15.7 Bab	111.1 $\pm$ 9.9 Ab	149.8 $\pm$ 20.5 ABa	67.9 $\pm$ 20.5 ABC	135.0 $\pm$ 17.1 A
X	19.8 $\pm$ 3.1 ABA	20.2 $\pm$ 0.7 Ab	18.6 $\pm$ 2.1 Ba	19.1 $\pm$ 1.7 Ab	20.7 $\pm$ 4.2 ABa	23.8 $\pm$ 6.0 Aa	19.6 $\pm$ 0.9 A
80 - 100							
MASS	139.3 $\pm$ 30.9 ABB	119.8 $\pm$ 8.6 ABbc	146.4 $\pm$ 23.4 Bab	114.3 $\pm$ 10.4 Abc	188.5 $\pm$ 67.6 Aa	82.4 $\pm$ 30.2 Ac	141.7 $\pm$ 29.4 A
X	18.2 $\pm$ 2.0 Bc	19.4 $\pm$ 1.9 Abc	19.9 $\pm$ 2.9 Bbc	19.7 $\pm$ 2.7 Abc	25.6 $\pm$ 8.1 Aab	28.6 $\pm$ 7.1 Aa	20.5 $\pm$ 3.0 A
100 - 120							
MASS	124.1 $\pm$ 65.0 ABa	92.2 $\pm$ 34.8 ABCab	96.1 $\pm$ 24.6 Cab	85.7 $\pm$ 14.7 Bab	89.7 $\pm$ 25.6 Bab	31.9 $\pm$ 12.3 Cb	97.7 $\pm$ 24.1 B
X	16.1 $\pm$ 6.3 Ba	14.8 $\pm$ 5.3 ABa	13.1 $\pm$ 3.3 Ca	14.7 $\pm$ 2.6 Ba	12.0 $\pm$ 1.4 Ba	11.0 $\pm$ 3.3 Ba	14.4 $\pm$ 2.1 B
Total							
	$\bar{X} \pm SD$	$774.9 \pm 210.9$ A	$620.5 \pm 60.8$ b	$734.9 \pm 21.0$ ab	$583.9 \pm 47.1$ b	$739.3 \pm 134.7$ ab	$289.7 \pm 65.6$ c
							$690.9 \pm 136.3$ ab

<sup>a</sup>Data from control samples (MT) not included.

<sup>b</sup>Data in a column followed by the same upper-case letter, or data in a row followed by the same lower-case letter, are not significantly different ( $p \geq 0.05$ ).

AGDE: *Agropyron desertorum*, crested wheatgrass

ELLA: *Elymus lanceolatus*, streambank wheatgrass

LECI: *Leymus cinereus*, giant wildrye

ARTR: *Artemisia tridentata* ssp. *wyomingensis*, Wyoming big sagebrush

SAKA: *Salsola kali* L., Russian thistle

MT: Control samples

**Table 7.** Summary of SDA plant shoot masses (from Table 3, Aurther, 1982).

Species	Subsurface Disposal Area Vegetative biomass (kg) <sup>a</sup>					
	A	B	C	D	Total	Control
Crested wheatgrass ( <i>Agropyron cristatum</i> )	11,200	10,400		5,600	27,200	27,200
Russian thistle ( <i>Salsola kali</i> )			4,900	3,200	8,100	8,100
TOTALS	11,200 (206) <sup>c</sup>	11,400 <sup>b</sup> (124) <sup>c</sup>	4,900 (107) <sup>c</sup>	8,800 <sup>b</sup> (158) <sup>c</sup>	36,300 <sup>b</sup>	36,300
TOTAL AREA(m <sup>2</sup> )	54,200	91,400	45,700	55,900	247,500	247,500

<sup>a</sup> Total vegetation biomass estimated for each study area (A-D) by multiplying mean biomass per area (g/m<sup>2</sup> - dry wt.) by the surface area (m<sup>2</sup>) (Authur (1982) page 395).

<sup>b</sup> Includes species other than crested wheatgrass and Russian thistle.

<sup>c</sup> Plot mean vegetative biomasses (g/m<sup>2</sup>) (Authur (1982) page 397).

**Table 8.** Fraction of plant cover.

Plant Species or Plant Type	Common Name	% Cover	Reference
Genus, species, or type			
<i>Agropyron</i> spp. (line intercept) (1985)	Wheatgrass	0.49	Anderson 1991
<i>Agropyron</i> spp. (point intercept) (1985)	Wheatgrass	1.21	Anderson 1991
<i>Agropyron</i> spp. (line intercept) (1990)	Wheatgrass	1.56	Anderson 1991
<i>Agropyron</i> spp. (point intercept) (1990)	Wheatgrass	2.03	Anderson 1991
Annual forbs (Point intercept) (1985)		1.79	Anderson 1991
Annual forbs (Point intercept) (1990)		2.73	Anderson 1991
<i>Artemisia tridentata</i> (1981)	Big sagebrush	18	Anderson and Holte 1981
<i>Artemisia tridentata</i> (1983)	Big sagebrush	15.0	Anderson 1986
<i>Artemisia tridentata</i> (line intercept) (1985)	Big sagebrush	16.41	Anderson 1991
<i>Artemisia tridentata</i> (point intercept) (1985)	Big sagebrush	12.97	Anderson 1991
<i>Artemisia tridentata</i> (line intercept) (1990)	Big sagebrush	11.97	Anderson 1991
<i>Artemisia tridentata</i> (point intercept) (1990)	Big sagebrush	10.75	Anderson 1991
<i>Bromus tectorum</i> (line intercept) (1985)	Cheatgrass		Anderson 1991
<i>Bromus tectorum</i> (point intercept) (1985)	Cheatgrass	0.03	Anderson 1991
<i>Bromus tectorum</i> (line intercept) (1990)	Cheatgrass		Anderson 1991
<i>Bromus tectorum</i> (point intercept) (1990)	Cheatgrass	2.97	Anderson 1991
<i>Chrysothamnus vicidiflorus</i> (1983)	Green rabbitbrush	4.0	Anderson 1986
<i>Chrysothamnus vicidiflorus</i> (line intercept) (1985)	Green rabbitbrush	6.19	Anderson 1991
<i>Chrysothamnus vicidiflorus</i> (point intercept) (1985)	Green rabbitbrush	4.28	Anderson 1991
<i>Chrysothamnus vicidiflorus</i> (line intercept) (1990)	Green rabbitbrush	4.66	Anderson 1991
<i>Chrysothamnus vicidiflorus</i> (point intercept) (1990)	Green rabbitbrush	4.67	Anderson 1991
Grasses (1981)		3	Anderson and Holte 1981
Grasses (Line intercept) (1985)		1.35	Anderson 1991
Grasses (Point intercept) (1985)		2.58	Anderson 1991
Grasses (Line intercept) (1990)		4.04	Anderson 1991
Grasses (Point intercept) (1990)		8.18	Anderson 1991
<i>Oryzopsis hymenoides</i> (line intercept) (1985)	Indian ricegrass	0.14	Anderson 1991
<i>Oryzopsis hymenoides</i> (point intercept) (1985)	Indian ricegrass	0.26	Anderson 1991
<i>Oryzopsis hymenoides</i> (line intercept) (1990)	Indian ricegrass	0.24	Anderson 1991
<i>Oryzopsis hymenoides</i> (point intercept) (1990)	Indian ricegrass	0.37	Anderson 1991
Perennial forbs (Point intercept) (1985)		1.37	Anderson 1991
Perennial forbs (Point intercept) (1990)		1.77	Anderson 1991
Perennial grasses (1983)		1.0	Anderson 1986
<i>Poa</i> spp. (line intercept) (1985)	Bluegrass	0.04	Anderson 1991
<i>Poa</i> spp. (point intercept) (1985)	Bluegrass	0.08	Anderson 1991
<i>Poa</i> spp. (line intercept) (1990)	Bluegrass	0.11	Anderson 1991
<i>Poa</i> spp. (point intercept) (1990)	Bluegrass	0.3	Anderson 1991
Shrubs (1981)		26	Anderson and Holte 1981
Shrub cover (1983)		19.0	Anderson 1986
Shrubs (Line intercept) (1985)		23.86	Anderson 1991
Shrubs (Point intercept) (1985)		19.18	Anderson 1991
Shrubs (Line intercept) (1990)		18.01	Anderson 1991
Shrubs (Point intercept) (1990)		18.06	Anderson 1991
Shrubs and grasses (1981)		28	Anderson and Holte 1981
Shrubs and grasses (1983)		21.8	Anderson 1986
<i>Sitanion hystrix</i> (line intercept) (1985)	Bottlebrush Squirretail	0.27	Anderson 1991
<i>Sitanion hystrix</i> (point intercept) (1985)	Bottlebrush Squirretail	0.48	Anderson 1991
<i>Sitanion hystrix</i> (line intercept) (1990)	Bottlebrush Squirretail	1	Anderson 1991
<i>Sitanion hystrix</i> (point intercept) (1990)	Bottlebrush Squirretail	1.02	Anderson 1991
<i>Stipa comata</i> (line intercept) (1985)	Needle-and-thread grass	0.38	Anderson 1991
<i>Stipa comata</i> (point intercept) (1985)	Needle-and-thread grass	0.48	Anderson 1991
<i>Stipa comata</i> (line intercept) (1990)	Needle-and-thread grass	1.13	Anderson 1991
<i>Stipa comata</i> (point intercept) (1990)	Needle-and-thread grass	1.48	Anderson 1991

**Table 8a.** Plant density.

Plant or Community Type		Plants/m <sup>2</sup>	Reference
Plant or Plant Community	Common Name		
Grasses (1985)		61.8	Anderson 1991
Grasses (1990)		37.8	Anderson 1991
Shrubs (1985)		4	Anderson 1991
Shrubs (1990)		4.4	Anderson 1991
Perennial forbs (1985)		3.5	Anderson 1991
Perennial forbs (1990)		4.8	Anderson 1991
Annual species (1985)		30.4	Anderson 1991
Annual species (1990)		164.1	Anderson 1991
<i>Artemesia tridentata</i> (1985)	Big sagebrush	1.7	Anderson 1991
<i>Artemesia tridentata</i> (1990)	Big sagebrush	2.3	Anderson 1991
<i>Chrysothamnus vicidiflorus</i> (1985)	Green rabbitbrush	1.7	Anderson 1991
<i>Chrysothamnus vicidiflorus</i> (1990)	Green rabbitbrush	1.3	Anderson 1991
<i>Bromus tectorum</i> (1985)	Cheatgrass	7.4	Anderson 1991
<i>Bromus tectorum</i> (1990)	Cheatgrass	10	Anderson 1991
<i>Agropyron spp.</i> (1985)	Wheatgrass	47.5	Anderson 1991
<i>Agropyron spp.</i> (1990)	Wheatgrass	29.4	Anderson 1991
<i>Poa spp.</i> (1985)	Bluegrass	0.6	Anderson 1991
<i>Poa spp.</i> (1990)	Bluegrass	1.1	Anderson 1991
<i>Oryzopsis hymenoides</i> (1985)	Indian Ricegrass	0.6	Anderson 1991
<i>Oryzopsis hymenoides</i> (1990)	Indian Ricegrass	0.4	Anderson 1991
<i>Sitanion hystrix</i> (1985)	Bottlebrush Squirretail	5.7	Anderson 1991
<i>Sitanion hystrix</i> (1990)	Bottlebrush Squirretail	3.3	Anderson 1991
<i>Stipa comata</i> (1985)	Needle-and-thread grass	2	Anderson 1991
<i>Stipa comata</i> (1990)	Needle-and-thread grass	3.6	Anderson 1991

These data represent a compilation of data collected from long-term vegetation plots established at the INEL since the 1950s. Most likely, none of these data represent plots which have seen any disturbance. It is assumed that general plant community compositions across the INEL could be derived from these data. Data specific to developing succession scenarios for any facilities areas across the INEL were not located in any of the studies reviewed.

**Table 9a. Preliminary INEL specific plant contaminant concentration values.**

Sample Collection Date	Sample ID	Radionuclide	Concentration	Unit	Location	Reference
1978	Crested Wheatgrass	Sr-90	0.45	pCi/g dw	SDA A	Arthur 1982
1978?	Surface Soils	Sr-90	0.22	pCi/g dw	SDA A	Arthur 1982, Arthur and Markham 1983
1978	Crested Wheatgrass	Sr-90	0.17	pCi/g dw	SDA D	Arthur 1982
1978?	Surface Soils	Sr-90	0.2	pCi/g dw	SDA D	Arthur 1982, Arthur and Markham 1983
1978	Crested Wheatgrass	Cs-137	0.35	pCi/g dw	SDA A	Arthur 1982
1978?	Surface Soils	Cs-137	0.34	pCi/g dw	SDA A	Arthur 1982, Arthur and Markham 1983
1978	Crested Wheatgrass	Cs-137	0.26	pCi/g dw	SDA B	Arthur 1982
1978?	Surface Soils	Cs-137	0.42	pCi/g dw	SDA B	Arthur 1982, Arthur and Markham 1983
1978	Crested Wheatgrass	Cs-137	0.17	pCi/g dw	SDA D	Arthur 1982
1978?	Surface Soils	Cs-137	0.21	pCi/g dw	SDA D	Arthur 1982, Arthur and Markham 1983
1978	Russian Thistle	Sr-90	0.36	pCi/g dw	SDA C	Arthur 1982
1978?	Surface Soils	Sr-90	0.08	pCi/g dw	SDA C	Arthur 1982, Arthur and Markham 1983
1978	Russian Thistle	Sr-90	52.4	pCi/g dw	SDA D	Arthur 1982
1978?	Surface Soils	Sr-90	0.2	pCi/g dw	SDA D	Arthur 1982, Arthur and Markham 1983
1978	Russian Thistle	Cs-137	0.27	pCi/g dw	SDA C	Arthur 1982
1978?	Surface Soils	Cs-137	0.05	pCi/g dw	SDA C	Arthur 1982, Arthur and Markham 1983
1978	Russian Thistle	Cs-137	7.37	pCi/g dw	SDA D	Arthur 1982
1978?	Surface Soils	Cs-137	0.21	pCi/g dw	SDA D	Arthur 1982, Arthur and Markham 1983
	Surface Soils	Sr-90	0.22	pCi/g dw	SDA A	Arthur 1982, Arthur and Markham 1983
	Surface Soils	Sr-90	0.08	pCi/g dw	SDA C	Arthur 1982, Arthur and Markham 1983
	Surface Soils	Sr-90	0.2	pCi/g dw	SDA D	Arthur 1982, Arthur and Markham 1983
	MEAN		0.17			Arthur 1982, Arthur and Markham 1983
	Surface Soils	Cs-137	0.34	pCi/g dw	SDA A	Arthur 1982, Arthur and Markham 1983
	Surface Soils	Cs-137	0.42	pCi/g dw	SDA B	Arthur 1982, Arthur and Markham 1983
	Surface Soils	Cs-137	0.05	pCi/g dw	SDA C	Arthur 1982, Arthur and Markham 1983
	Surface Soils	Cs-137	0.21	pCi/g dw	SDA D	Arthur 1982, Arthur and Markham 1983
	MEAN		0.25			

**Table 9b.** Plant uptake factors for nonradiological contaminants identified at the INEL.

Contaminant	CAS Number	PUF <sup>a</sup>
1,1,1-trichloroethane	71-55-6	1.39E+00
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	2.70E+00
2-Butanone	78-93-3	2.74E+01
Acetone	67-64-1	>8.38E+00 <sup>b</sup>
Aluminum nitrate	7784-27-2	1.00E+00 <sup>c</sup>
Ammonia	766-44	1.00E+00 <sup>c</sup>
Anthracene	120-12-7	1.04E-01
Antimony	7440-36-0	2.00E-01
Arsenic	7440-38-2	4.00E-02
Asbestos	1332-21-4	1.00E+00 <sup>c</sup>
Benzine	8032-32-4	1.00E+00 <sup>c</sup>
Beryllium	7440-41-7	1.00E-02
Butyl alcohol	71-36-3	1.00E+00 <sup>c</sup>
Cadmium	7440-43-9	5.50E-01
Carbon tetrachloride	56-23-5	8.96E-02
Cerium chloride	7790-86-5	1.00E+00 <sup>c</sup>
Chloroform	67-66-3	2.81E+00
Chromium VI	7740-47-3	7.50E-03
Copper	7440-50-8	4.00E-01
Copper nitrate	3251-23-8	1.00E+00 <sup>c</sup>
Ethyl alcohol	64-17-5	>8.38E+00 <sup>b</sup>
Formaldehyde	50-00-0	>8.38E+00 <sup>b</sup>
Hydrazine	302-01-2	>8.38E+00 <sup>b</sup>
Hydrofluoric acid	7664-39-3	1.00E+00 <sup>c</sup>
Lead	7439-92-1	4.50E-02
Magnesium	7439-95-4	1.00E+00
Magnesium fluoride	7783-40-6	1.00E+00
Mercury nitrate monohydrate	7783-34-8	9.00E-01
Methyl alcohol	67-56-1	1.00E+00 <sup>c</sup>
Methyl isobutyl ketone	108-10-1	1.00E+00 <sup>c</sup>
Methylene chloride	75-09-2	6.86E+00
Nickel	7440-02-0	6.00E-02
Nitric Acid	7697-37-2	1.00E+00 <sup>c</sup>
Potassium chloride	7447-40-7	1.00E+00 <sup>c</sup>
Potassium hydroxide	1310-61-1	1.00E+00 <sup>c</sup>
Potassium nitrate	7757-79-1	1.00E+00 <sup>c</sup>
Potassium phosphate	7778-77-0	1.00E+00 <sup>c</sup>
Potassium sulfate	7778-80-5	1.00E+00 <sup>c</sup>
Silver	7440-22-4	4.00E-01
Sodium	7440-23-5	7.50E-02
Sodium chloride	7647-14-5	7.50E-02
Sodium cyanide	143-33-9	7.50E-02
Sodium hydroxide	1310-73-2	7.50E-02

**Table 9b.** (continued)

Contaminant	CAS Number	PUF*
Sodium nitrate	7631-99-4	7.50E-02
Sodium phosphate	10101-89-0	7.50E-02
Sodium-potassium	11135-81-2	7.50E-02
Sodium sulfate	7757-82-6	7.50E-02
Sulfuric acid	7664-93-9	1.00E+00 <sup>c</sup>
Terphenyl	26140-60-3	1.00E+00 <sup>c</sup>
Tetrachloroethylene	127-18-4	1.22E+00
Toluene	108-88-3	1.14E+00
Tributyl phosphate	126-73-8	1.00E+00 <sup>c</sup>
Trichloroethylene	79-01-6	1.63E+00
Trimethylolpropane-triester	15625-89-5	1.00E+00 <sup>c</sup>
Uranyl nitrate	10102-06-4	8.50E-03
Xylene	1330-20-7	5.04E-01
Zirconium	7440-67-7	2.00E-03
Total uranium	7440-61-1	8.50E-03

a. Plant uptake factors (PUFs) for organics were developed using the allometric equation for plant uptake of organics presented by Travis and Arms (1988). For non-organics PUFs were taken from Baes et.al., 1984).

b. The K<sub>ow</sub> for the organic contaminant was outside the range reported in Travis and Arms (1988).

c. No value could be developed. Default of 1 was used.

**Table 9c.** Plant uptake factors for radionuclides identified at the INEL<sup>a</sup>.

Contaminant	PUF	Contaminant	PUF	Contaminant	PUF
Ac-225	3.50E-03	Hf-181	5.50E-03	Rh-103m	1.60E-01
Ac-227	3.50E-03	Hg-203	9.00E-01	Rh-106	1.60E-01
Ac-228	3.50E-03	I-125	1.50E-01	Rn-222	1.00E+00
Ag-108	4.00E-01	I-129	1.50E-01	Ru-103	7.50E-02
Ag-108m	4.00E-01	I-131	1.50E-01	Ru-106	7.50E-02
Ag-109	4.00E-01	I-133	1.50E-01	S-35	1.50E+00
Ag-110	4.00E-01	In-113m	4.00E-03	Sb-124	2.00E-01
Ag-110m	4.00E-01	Ir-192	5.50E-02	Sb-125	2.00E-01
Am-241	5.50E-03	La-140	1.00E-02	Sc-44	6.00E-03
Am-242	5.50E-03	Mn-53	2.50E-01	Sc-46	6.00E-03
Am-243	5.50E-03	Mn-54	2.50E-01	Se-75	2.50E-02
Ba-133	1.50E-01	Mn-56	2.50E-01	Sm-147	1.00E-02
Ba-137m	1.50E-01	Mo-99	2.50E-01	Sn-113	3.00E-02
Ba-140	1.50E-01	Na-22	7.50E-02	Sn-117m	3.00E-02
Be-7	1.00E-02	Nb-93m	2.00E-02	Sn-119m	3.00E-02
Be-10	1.00E-02	Nb-94	2.00E-02	Sr-85	1.11E+00
Bi-210	3.50E-02	Nb-95	2.00E-02	Sr-89	1.11E+00
Bi-214	3.50E-02	Ni-59	4.00E-02	Sr-90	1.11E+00
Ca-45	3.50E+00	Ni-63	4.00E-02	Sr-91	1.11E+00
Cd-104	5.50E-01	Np-237	1.00E-01	Ta-182	1.00E-02
Cd-109	5.50E-01	Np-239	1.00E-01	Tc-99	9.50E+00
Ce-139	1.00E-02	P-32	3.50E+00	Te-125m	2.50E-02
Ce-141	1.00E-02	Pa-231	2.50E-03	Th-228	8.50E-04
Ce-144	1.00E-02	Pa-233	2.50E-03	Th-229	8.50E-04
Cf-252	1.00E+00 <sup>b</sup>	Pa-234m	2.50E-03	Th-230	8.50E-04
Cl-36	7.00E+01	Pb-210	4.50E-02	Th-231	8.50E-04
Cm-242	8.50E-04	Pb-212	4.50E-02	Th-232	8.50E-04
Cm-244	8.50E-04	Pb-214	4.50E-02	Th-234	8.50E-04
Cm-248	8.50E-04	Pm-147	1.00E-02	Tl-204	4.00E-03
Co-57	2.00E-02	Po-210	2.50E-03	Tm-170	1.00E-02
Co-58	2.00E-02	Po-212	2.50E-03	U-232	8.50E-03
Co-60	2.00E-02	Po-216	2.50E-03	U-233	8.50E-03
Cr-51	7.50E-03	Po-218	2.50E-03	U-234	8.50E-03
Cs-134	8.00E-02	Pr-143	1.00E-02	U-235	8.50E-03
Cs-136	8.00E-02	Pr-144	1.00E-02	U-236	8.50E-03
Cs-137	8.00E-02	Pu-238	4.50E-04	U-238	8.50E-03
Er-169	1.00E-02	Pu-239	4.50E-04	W-185	4.50E-02
Eu-152	1.00E-02	Pu-240	4.50E-04	Y-88	1.50E-02
Eu-154	1.00E-02	Pu-241	4.50E-04	Y-90	1.50E-02
Eu-155	1.00E-02	Pu-242	4.50E-04	Y-91	1.50E-02
Fe-55	4.00E-03	Ra-224	1.50E-02	Yb-164	1.00E-02
Fe-59	4.00E-03	Ra-225	1.50E-02	Zn-65	1.50E+00
Fr-221	3.00E-02	Ra-226	1.50E-02	Zr-93	2.00E-03
Fr-223	3.00E-02	Ra-228	1.50E-02	Zr-95	2.00E-03
Gd-153	1.00E-02	Rb-86	1.50E-01		
Hf-175	5.50E-03	Re-188	1.50E+00		

a. Plant uptake factors (PUFs) were taken from Baes et.al., (1984).

b. Baes et al., (1984) does not report values for elements with a atomic number greater than 96.

**Table 10. Preliminary INEL specific animal contaminant bioaccumulation data.**

Sample Collection Date	Sample ID	Radionuclide	Concentration	Unit	Location	Reference
1985?	Horned Lark carcass	Cs-137	1.07	pCi/g	SDA	Arthur and Janke 1986
1994?	Soil	Cs-137	0.393	pCi/g	SDA-OU 7-05,7-99	Van Horn, ECOL-RA.TXT, 2/27/95
1985?	Great Basin Rattlesnake carcass	Cs-137	0.32	pCi/g	SDA	Arthur and Janke 1986
1994?	Soil	Cs-137	0.393	pCi/g	SDA-OU 7-05,7-99	Van Horn, ECOL-RA.TXT, 2/27/95
1985?	Invertebrates composite	Sr-90	2.4	pCi/g	SDA	Arthur and Janke 1986
1986	Soil	Sr-90	0.52	pCi/g	Off-site	1986 Env Monit Report, Hoff et al., 1987
1985?	Invertebrates composite	Cs-137	0.47	pCi/g	SDA	Arthur and Janke 1986
1994?	Soil	Cs-137	0.393	pCi/g	SDA-OU 7-05,7-99	Van Horn, ECOL-RA.TXT, 2/27/95
1985?	Nuttall's Cottontail carcass	Sr-90	0.3	pCi/g	SDA	Arthur and Janke 1986
1986	Soil	Sr-90	0.52	pCi/g	Off-site	1986 Env Monit Report, Hoff et al., 1987
1985?	Nuttall's Cottontail carcass	Cs-137	0.14	pCi/g	SDA	Arthur and Janke 1986
1994?	Soil	Cs-137	0.393	pCi/g	SDA-OU 7-05,7-99	Van Horn, ECOL-RA.TXT, 2/27/95
1985	Cottontail Rabbit Hide	Sr-90	0.43	pCi/g wet w	SDA	Janke and Arthur 1985
1986	Soil	Sr-90	0.52	pCi/g	Off-site	1986 Env Monit Report, Hoff et al., 1987
1985	Cottontail Rabbit Hide	Cs-137	0.18	pCi/g wet w	SDA	Janke and Arthur 1985
1994?	Soil	Cs-137	0.393	pCi/g	SDA-OU 7-05,7-99	Van Horn, ECOL-RA.TXT, 2/27/95
1978-79	Deer Mice Lung	Sr-90	4.5	pCi/g dw	SDA	Arthur et al., 1987
1978?	Surface Soils	Sr-90	0.08	pCi/g dw	SDA Mean	Arthur 1982, Arthur and Markham 1983
1978-79	Deer Mice Lung	Cs-137	456	pCi/g dw	SDA	Arthur et al., 1987
1978?	Surface Soils	Cs-137	0.25	pCi/g dw	SDA Mean	Arthur 1982, Arthur and Markham 1983
1978-79	Deer Mice GI Tract	Cs-137	35.4	pCi/g dw	SDA	Arthur et al., 1987
1978?	Surface Soils	Cs-137	0.25	pCi/g dw	SDA Mean	Arthur 1982, Arthur and Markham 1983
1978-79	Deer Mice Pelt/Hide	Sr-90	417	pCi/g dw	SDA	Arthur et al., 1987
1978?	Surface Soils	Sr-90	0.08	pCi/g dw	SDA Mean	Arthur 1982, Arthur and Markham 1983

**Table 10. (continued)**

Sample Collection Date	Sample ID	Radionuclide	Concentration	Unit	Location	Reference
1978-79	<b>Deer Mice Pelt/Hide</b>	Cs-137	78.5	pCi/g dw	SDA	Arthur et al., 1987
1978?	Surface Soils	Cs-137	0.25	pCi/g dw	SDA Mean	Arthur 1982, Arthur and Markham 1983
1978-79	<b>Deer Mice Carcass</b>	Sr-90	721	pCi/g dw	SDA	Arthur et al., 1987
1978?	Surface Soils	Sr-90	0.08	pCi/g dw	SDA Mean	Arthur 1982, Arthur and Markham 1983
1978-79	<b>Deer Mice Carcass</b>	Cs-137	57.3	pCi/g dw	SDA	Arthur et al., 1987
1978?	Surface Soils	Cs-137	0.25	pCi/g dw	SDA Mean	Arthur 1982, Arthur and Markham 1983
1977-80	<b>Sage Grouse GI Tract</b>	Cs-137	0.2	pCi/g fresh w	RWMC	Connelly and Markham 1983
1978?	Surface Soils	Cs-137	0.25	pCi/g dw	SDA Mean	Arthur 1982, Arthur and Markham 1983
1977-80	<b>Sage Grouse Muscle</b>	Cs-137	0.4	pCi/g fresh w	RWMC	Connelly and Markham 1983
1978?	Surface Soils	Cs-137	0.25	pCi/g dw	SDA Mean	Arthur 1982, Arthur and Markham 1983
1974-1978	<b>Waterfowl Muscle</b>	Cs-137	732	pCi/g fresh w	TRA	Halford et al. 1981
1974-1978	<b>Waterfowl Skin</b>	Cs-137	215	pCi/g fresh w	TRA	Halford et al. 1981
1974-1978	<b>Waterfowl Liver</b>	Cs-137	1061	pCi/g fresh w	TRA	Halford et al. 1981
1974-1978	<b>Waterfowl Gut</b>	Cs-137	1087	pCi/g fresh w	TRA	Halford et al. 1981
1974-1978	<b>Waterfowl Feathers</b>	Cs-137	64	pCi/g fresh w	TRA	Halford et al. 1981
1974	<b>Mourning Doves GI Tract</b>	Cs-137	0.83	pCi/g	SDA 1974	Markham and Halford 1982
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976
1975	<b>Mourning Doves GI Tract</b>	Cs-137	1.2	pCi/g	SDA 1975	Markham and Halford 1982
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976
1974	<b>Pronghorn Antelope Muscle</b>	Cs-137		pCi/g	ICPP Before	Markham and Halford 1985
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976
1975	<b>Pronghorn Antelope Muscle</b>	Cs-137	0.05	pCi/g	ICPP After	Markham and Halford 1985
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976
1974	<b>Pronghorn Antelope Liver</b>	Cs-137	1.04	pCi/g	ICPP Before	Markham and Halford 1985
1976	Surface Soil, INEL Boundary	Cs-137	0.57	pCi/g	INEL Boundary	Env Monit Report 1976

**Table 10. (continued)**

Sample Collection Date	Sample ID	Radionuclide	Concentration	Unit	Location	Reference
1975	<b>Pronghorn Antelope Liver</b>	Cs-137	0.07	pCi/g	ICPP After	Markham and Halford 1985
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976
1974	<b>Mourning Dove Muscle</b>	Cs-137	3.2	pCi/g	ICPP Before	Markham and Halford 1985
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976
1975	<b>Mourning Dove Muscle</b>	Cs-137	2	pCi/g	ICPP After	Markham and Halford 1985
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976
1972	<b>Pronghorn Metacarpels</b>	Sr-90	12.4	pCi/g ash	ICPP 1972	Markham et al., 1980a
1976	Surface Soil, INEL Boundary	Sr-90	0.5	pCi/g	INEL Boundary	Env Monit Report 1976
1973	<b>Pronghorn Metacarpels</b>	Sr-90	18.7	pCi/g ash	ICPP 1973	Markham et al., 1980a
1976	Surface Soil, INEL Boundary	Sr-90	0.5	pCi/g	INEL Boundary	Env Monit Report 1976
1974	<b>Pronghorn Metacarpels</b>	Sr-90	4.5	pCi/g ash	ICPP 1974	Markham et al., 1980a
1976	Surface Soil, INEL Boundary	Sr-90	0.5	pCi/g	INEL Boundary	Env Monit Report 1976
1975	<b>Pronghorn Metacarpels</b>	Sr-90	4.4	pCi/g ash	ICPP 1975	Markham et al., 1980a
1976	Surface Soil, INEL Boundary	Sr-90	0.5	pCi/g	INEL Boundary	Env Monit Report 1976
1976	<b>Pronghorn Metacarpels</b>	Sr-90	2.6	pCi/g ash	ICPP 1976	Markham et al., 1980a
1976	Surface Soil, INEL Boundary	Sr-90	0.5	pCi/g	INEL Boundary	Env Monit Report 1976
1972	<b>Pronghorn Muscle</b>	Cs-137	0.852	pCi/g wet w	ICPP 1972	Markham et al. 1982
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976
1973	<b>Pronghorn Muscle</b>	Cs-137	0.221	pCi/g wet w	ICPP 1973	Markham et al. 1982
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976
1974	<b>Pronghorn Muscle</b>	Cs-137	1.405	pCi/g wet w	ICPP 1974	Markham et al. 1982
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976
1975	<b>Pronghorn Muscle</b>	Cs-137	0.154	pCi/g wet w	ICPP 1975	Markham et al. 1982
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976

  

Sample	Sample ID	Radionuclide	Concentration	Unit	Location	Reference
--------	-----------	--------------	---------------	------	----------	-----------

**Table 10.** (continued)

Collection Date							
1976	<b>Pronghorn Muscle</b>	Cs-137	0.053	pCi/g wet w	ICPP 1976	Markham et al. 1982	
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976	
1972	<b>Pronghorn Liver</b>	Cs-137	1.652	pCi/g wet w	ICPP 1972	Markham et al. 1982	
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976	
1973	<b>Pronghorn Liver</b>	Cs-137	0.301	pCi/g wet w	ICPP 1973	Markham et al. 1982	
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976	
1974	<b>Pronghorn Liver</b>	Cs-137	1.725	pCi/g wet w	ICPP 1974	Markham et al. 1982	
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976	
1975	<b>Pronghorn Liver</b>	Cs-137	0.541	pCi/g wet w	ICPP 1975	Markham et al. 1982	
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976	
1976	<b>Pronghorn Liver</b>	Cs-137	0.046	pCi/g wet w	ICPP 1976	Markham et al. 1982	
1976	Surface Soil, INEL Boundary	Cs-137	0.83	pCi/g	INEL Boundary	Env Monit Report 1976	
Mallard ducks Muscle							
	Sr-90	78	mBq/g dry	TRA	Markham et al. 1988		
Mallard ducks Bone							
	Sr-90	52,900	mBq/g dry	TRA	Markham et al. 1988		
Mallard ducks Liver							
	Sr-90	569	mBq/g dry	TRA	Markham et al. 1988		
Mallard ducks Lung							
	Sr-90	360	mBq/g dry	TRA	Markham et al. 1988		
Mallard ducks short duration							
Muscle							
	Sr-90	4.4	mBq/g dry	TRA	Markham et al. 1988		
Bone							
	Sr-90	20700	mBq/g dry	TRA	Markham et al. 1988		

**Table 11.** Summary of INEL wildlife biological parameters.

ALL SPECIES AND FUNCTIONAL GROUPS - 5/95									
Functional groups	'PP	'PV	'PSa	ED*	ED*	AE**	IR diet****	BW'(kg)	Home range'
	% prey	% vegetation	% soil	min	max		^(kg/day)	Body wt.	(Ha)
<b>Amphibian insectivores (A232) INCOMPLETE</b>									
Great Basin spadefoot toad ( <i>Spea intermontana</i> )									
Boreal chorus frog ( <i>Pseudacris triseriata</i> )									
<b>Avian herbivores (AV121)</b>									
Pine siskin ( <i>Carduelis pinus</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	P		1.46e-02	
American goldfinch ( <i>Carduelis tristis</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	P		1.32e-02	
Evening grosbeak ( <i>Coccothraustes vespertinus</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	P		5.40e-02	
Cedar waxwing ( <i>Bombycilla cedrorum</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	P		3.31e-02	
<b>Avian herbivores (AV122)</b>									
House sparrow ( <i>Passer domesticus</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	6.50e-01	P	6.76e-03	2.80e-02	
Rufous hummingbird ( <i>Selasphorus rufus</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	P	1.54e-03	3.50e-03	
Mourning dove ( <i>Zenaida macroura</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	1.00e+00	N/D		9.45e-03	1.23e-01
Lark sparrow ( <i>Chondestes grammacus</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	P	6.96e-03	2.90e-02	1.04e+01
Snow bunting ( <i>Plectrophenax nivalis</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	P	9.58e-03	4.22e-02	
Rosy finch ( <i>Leucosticte arctoa</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	P	6.45e-03	2.65e-02	
House finch ( <i>Carpodacus mexicanus</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	P	5.38e-03	2.14e-02	
Gray partridge ( <i>Perdix perdix</i> )	0.00e+00	9.07e-01	9.30e-02	5.00e-02	1.00e+00	N/D		1.59e-02	3.98e-01
Chukar ( <i>Alectoris chukar</i> )	0.00e+00	9.07e-01	9.30e-02	5.00e-02	1.00e+00	N/D		1.94e-02	6.19e-01
Blue grouse ( <i>Dendragapus obscurus</i> )	0.00e+00	9.07e-01	9.30e-02	5.00e-02	2.50e-01	N/D		2.59e-02	1.19e+00
Sage grouse ( <i>Centrocercus urophasianus</i> )	0.00e+00	9.07e-01	9.30e-02	5.00e-02	1.00e+00	N/D		4.02e-02	3.19e+00
Horned lark ( <i>Eremophila alpestris</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	1.00e+00	P/D	7.55e-03	5.18e-03	3.19e-02
Dark-eyed junco ( <i>Junco hyemalis</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	P/D	5.16e-03	4.25e-03	2.04e-02
Rock dove ( <i>Columba livia</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	1.00e+00	N/D		1.54e-02	3.69e-01
<b>Avian herbivores (AV132)</b>									
Sora ( <i>Porzana carolina</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	6.50e-01	N		6.19e-02	
<b>Avian herbivores (AV142)</b>									
Snow goose ( <i>Chen caerulescens</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	N		4.96e+00	
Green-winged teal ( <i>Anas crecca</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	N		3.64e-01	

**Table 11.** (continued)

Redhead duck ( <i>Aythya americana</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	N			1.10e+00	
Ring-necked duck ( <i>Aythya collaris</i> )	0.00e+00	9.80e-01	2.00e-02	5.00e-02	2.50e-01	N			7.31e-01	
<b>Avian herbivores (AV143)</b>										
Tundra swan ( <i>Cygnus columbianus</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	N	2.08e-01		7.10e+00	
Canada goose ( <i>Branta canadensis</i> )	0.00e+00	9.17e-01	8.30e-02	5.00e-02	2.50e-01	N	1.65e-01		4.96e+00	9.83e+02
Mallard ( <i>Anas platyrhynchos</i> )	0.00e+00	9.67e-01	3.30e-02	5.00e-02	6.50e-01	N	6.73e-02		1.25e+00	6.20e+02
Northern pintail ( <i>Anas acuta</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	N	5.97e-02		1.04e+00	
Blue-winged teal ( <i>Anas discors</i> )	0.00e+00	9.80e-01	2.00e-02	5.00e-02	6.50e-01	N	3.25e-02		4.09e-01	
Cinnamon teal ( <i>Anas cyanoptera</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	N	3.24e-02		4.08e-01	
Northern shoveler ( <i>Anas clypeata</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	6.50e-01	N	4.33e-02		6.36e-01	
Gadwall ( <i>Anas strepera</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	N	5.78e-02		9.90e-01	
American wigeon ( <i>Anas americana</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	2.50e-01	N	4.94e-02		7.92e-01	
Canvasback ( <i>Aythya valisineria</i> )	0.00e+00	9.90e-01	1.00e-02	5.00e-02	6.50e-01	N	6.73e-02		1.25e+00	
<b>Avian insectivores (AV210) - NEED PS for ALL INSECTIVORE GROUPS</b>										
Black tern ( <i>Chlidonias niger</i> )		0.00e+00		5.00e-02	2.50e-01	N			6.53e-02	
Olive-sided flycatcher ( <i>Contopus borealis</i> )		0.00e+00		5.00e-02	2.50e-01	P			3.21e-02	3.04e-01
Western flycatcher ( <i>Empidonax difficilis</i> )		0.00e+00		5.00e-02	2.50e-01	P			1.00e-02	3.04e-01
Ash-throated flycatcher ( <i>Myiarchus cinerascens</i> )		0.00e+00		5.00e-02	2.50e-01	P			2.72e-02	3.04e-01
Western kingbird ( <i>Tyrannus verticalis</i> )		0.00e+00		5.00e-02	6.50e-01	P/D			3.96e-02	
Eastern kingbird ( <i>Tyrannus tyrannus</i> )		0.00e+00		5.00e-02	6.50e-01	P/D			4.36e-02	
Tree swallow ( <i>Tachycineta bicolor</i> )		0.00e+00		5.00e-02	6.50e-01	P			2.01e-02	
Violet-green swallow ( <i>Tachycineta thalassina</i> )		0.00e+00		5.00e-02	6.50e-01	P			1.44e-02	
Townsend's solitaire ( <i>Myadestes townsendi</i> )		0.00e+00		5.00e-02	2.50e-01	P			3.40e-02	
Common nighthawk ( <i>Chordeiles minor</i> )		0.00e+00		5.00e-02	6.50e-01	N/D				
White-throated swift ( <i>Aeronautes saxatalis</i> )		0.00e+00		5.00e-02	2.50e-01	P			3.21e-02	
Say's phoebe ( <i>Sayornis saya</i> )		0.00e+00		5.00e-02	6.50e-01	P			2.12e-02	
<b>Avian insectivores (AV210A) PS for burrowing owl</b>										
Northern rough-winged swallow ( <i>Stelgidopteryx serripennis</i> )	9.70e-01	0.00e+00	3.00e-02	5.00e-02	6.50e-01	P			1.59e-02	
Bank swallow ( <i>Kiparia riparia</i> )	9.70e-01	0.00e+00	3.00e-02	5.00e-02	6.50e-01	P			1.46e-02	
Cliff swallow ( <i>Hirundo pyrrhonota</i> )	9.70e-01	0.00e+00	3.00e-02	5.00e-02	6.50e-01	P			2.16e-02	
Barn swallow ( <i>Hirundo rustica</i> )	9.70e-01	0.00e+00	3.00e-02	5.00e-02	6.50e-01	P			1.62e-02	
<b>Avian insectivores (AV221)</b>										
Ruby-crowned kinglet ( <i>Regulus calendula</i> )		0.00e+00		5.00e-02	2.50e-01	P			6.90e-03	
Western bluebird ( <i>Sialia mexicana</i> )		0.00e+00		5.00e-02	2.50e-01	P			2.90e-02	
Bohemian waxwing ( <i>Bombycilla garrulus</i> )		0.00e+00		5.00e-02	2.50e-01	P			5.64e-02	
Warbling vireo ( <i>Vireo gilvus</i> )		0.00e+00		5.00e-02	2.50e-01	P			1.48e-02	
Yellow warbler ( <i>Dendroica petechia</i> )		0.00e+00		5.00e-02	6.50e-01	P			9.80e-03	2.02e-01
Yellow-rumped warbler ( <i>Dendroica coronata</i> )		0.00e+00		5.00e-02	2.50e-01	P			1.29e-02	
Townsend's warbler ( <i>Dendroica townsendi</i> )		0.00e+00		5.00e-02	2.50e-01	P			9.10e-03	

**Table 11.** (continued)

Common yellowthroat ( <i>Geothlypis trichas</i> )		0.00e+00		5.00e-02	2.50e-01	P			1.03e-02	
Wilson's warbler ( <i>Wilsonia pusilla</i> )		0.00e+00		5.00e-02	2.50e-01	P			7.70e-03	4.86e-01
Yellow-breasted chat ( <i>Icteria virens</i> )		0.00e+00		5.00e-02	2.50e-01	P			2.55e-02	
Western tanager ( <i>Piranga ludoviciana</i> )		0.00e+00		5.00e-02	2.50e-01	P			2.81e-02	
Black-headed grosbeak ( <i>Pheucticus melanocephalus</i> )		0.00e+00		5.00e-02	2.50e-01	P			4.22e-02	
Northern oriole ( <i>Icterus galbula</i> )		0.00e+00		5.00e-02	2.50e-01	P			3.43e-02	
Downy woodpecker ( <i>Picoides pubescens</i> )		0.00e+00		5.00e-02	6.50e-01	N			2.70e-02	
Northern flicker ( <i>Colaptes auratus</i> )		0.00e+00		5.00e-02	6.50e-01	N			1.35e-01	
<b>Avian insectivores (AV222)</b>										
Franklin's gull ( <i>Larus pipixcan</i> )		0.00e+00		5.00e-02	2.50e-01	N	2.54e-02		2.80e-01	
California gull ( <i>Larus californicus</i> )		0.00e+00		5.00e-02	2.50e-01	N	4.42e-02		6.57e-01	
European starling ( <i>Sturnus vulgaris</i> )		0.00e+00		5.00e-02	1.00e+00	P/D	1.73e-02	8.00e-03	8.47e-02	
House wren ( <i>Troglodytes aedon</i> )		0.00e+00		5.00e-02	1.00e+00	P	3.03e-03		1.09e-02	
Mountain bluebird ( <i>Sialia currucoides</i> )		0.00e+00		5.00e-02	2.50e-01	P/D	7.09e-03	5.01e-03	2.96e-02	1.62e+00
American robin ( <i>Turdus migratorius</i> )		0.00e+00		5.00e-02	6.50e-01	P/D	1.76e-02	8.06e-03	8.62e-02	4.20e-01
Sage thrasher ( <i>Oreoscoptes montanus</i> )		0.00e+00		5.00e-02	6.50e-01	P/D	1.02e-02	6.07e-03	4.55e-02	
Lazuli bunting ( <i>Passerina amoena</i> )		0.00e+00		5.00e-02	2.50e-01	P	4.20e-03		1.60e-02	
Chipping sparrow ( <i>Spizella passerina</i> )		0.00e+00		5.00e-02	2.50e-01	P	3.36e-03		1.23e-02	
Brewer's sparrow ( <i>Spizella breweri</i> )		0.00e+00		5.00e-02	6.50e-01	P/D	3.03e-03		1.09e-02	
Black-throated sparrow ( <i>Amphispiza bilineata</i> )		0.00e+00		5.00e-02	2.50e-01	P	3.64e-03		1.35e-02	
Sage sparrow ( <i>Amphispiza bellii</i> )		0.00e+00		5.00e-02	6.50e-01	P/D	4.93e-03	4.14e-03	1.93e-02	
Savannah sparrow ( <i>Passerculus sandwichensis</i> )		0.00e+00		5.00e-02	2.50e-01	P/D	5.21e-03	4.27e-03	2.06e-02	
White-crowned sparrow ( <i>Zonotrichia leucophrys</i> )		0.00e+00		5.00e-02	2.50e-01	P/D	7.05e-03	5.00e-03	2.94e-02	
Western meadowlark ( <i>Sturnella neglecta</i> )		0.00e+00		5.00e-02	6.50e-01	P/D	2.20e-02	9.06e-03	1.12e-01	
Brewer's blackbird ( <i>Euphagus cyanocephalus</i> )		0.00e+00		5.00e-02	6.50e-01	P/D	1.42e-02	7.22e-03	6.72e-02	
Brown-headed cowbird ( <i>Molothrus ater</i> )		0.00e+00		5.00e-02	2.50e-01	P	1.09e-02		4.90e-02	
Killdeer ( <i>Charadrius vociferus</i> )		0.00e+00		5.00e-02	6.50e-01	N	1.31e-02		1.01e-01	
Water pipit ( <i>Anthus spinoletta</i> )		0.00e+00		5.00e-02	2.50e-01	P	5.91e-03		2.39e-02	
Green-tailed towhee ( <i>Pipilo chlorurus</i> )		0.00e+00		5.00e-02	2.50e-01	P/D	7.05e-03	5.00e-03	2.94e-02	
Rufous-sided towhee ( <i>Pipilo erythrrophthalmus</i> )		0.00e+00		5.00e-02	2.50e-01	P/D	9.48e-03	5.84e-03	4.17e-02	
Vesper sparrow ( <i>Pooecetes gramineus</i> )		0.00e+00		5.00e-02	6.50e-01	P/D	6.41e-03	4.77e-03	2.65e-02	
Lark bunting ( <i>Calamospiza melanocorys</i> )		0.00e+00		5.00e-02	2.50e-01	P	8.69e-03		3.76e-02	
Song sparrow ( <i>Melospiza melodia</i> )		0.00e+00		5.00e-02	2.50e-01	P	5.29e-03		2.10e-02	
<b>Avian insectivores (AV222A) PS for burrowing owl</b>										
Rock wren ( <i>Salpinctes obsoletus</i> )	9.70e-01	0.00e+00	3.00e-02	5.00e-02	6.50e-01	P/D	4.31e-03	3.87e-03	1.65e-02	
Canyon wren ( <i>Catherpes mexicanus</i> )	9.70e-01	0.00e+00	3.00e-02	5.00e-02	2.50e-01	P/D	3.43e-03	3.43e-03	1.26e-02	
<b>Avian insectivores (AV232) PS for woodduck</b>										
Red-winged blackbird ( <i>Agelaius phoeniceus</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	6.50e-01	P	1.36e-02		6.36e-02	
Yellow-headed blackbird ( <i>Xanthocephalus xanthocephalus</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	6.50e-01	P	1.64e-02		7.97e-02	

**Table 11.** (continued)

Spotted sandpiper ( <i>Actitis macularia</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N	7.96e-03		4.71e-02	2.50e-01	
Least sandpiper ( <i>Calidris minutilla</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	7.30e-02	N	1.27e-03		2.81e-03	2.32e-02	
<b>Avian insectivores (AV233) PS woodduck</b>											
Solitary sandpiper ( <i>Tringa solitaria</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			4.84e-02		
Willet ( <i>Catoptrophorus semipalmatus</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			2.15e-02		
Long-billed curlew ( <i>Numenius americanus</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N/D			6.42e-01		
Marbled godwit ( <i>Limosa fedoa</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			4.21e-01		
Long-billed dowitcher ( <i>Limnodromus scolopaceus</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			1.09e-01		
Common snipe ( <i>Gallinago gallinago</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			1.28e-01		
White-faced Ibis ( <i>Plegadis chihi</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			6.97e-01		
<b>Avian insectivores (AV241) PS woodduck</b>											
Wood duck ( <i>Aix sponsa</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			6.81e-01		
Red-necked phalarope ( <i>Phalaropus lobatus</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			3.49e-02		
Wilson's phalarope ( <i>Phalaropus tricolor</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			6.81e-02		
<b>Avian insectivores (AV242) Ps woodduck</b>											
Lesser scaup ( <i>Aythya affinis</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			8.60e-01	8.90e+01	
Common goldeneye ( <i>Bucephala clangula</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			1.00e+00		
Barrow's goldeneye ( <i>Bucephala islandica</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			1.09e+00		
Ruddy duck ( <i>Oxyura jamaicensis</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	6.50e-01	N			5.90e-01		
Lesser yellowlegs ( <i>Tringa flavipes</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			8.10e-02		
Bonaparte's gull ( <i>Larus philadelphicus</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			2.12e-01		
Bufflehead ( <i>Bucephala albeola</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			4.73e-01		
Pied-billed grebe ( <i>Podilymbus podiceps</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			4.42e-01		
Horned grebe ( <i>Podiceps auritus</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	2.50e-01	N			4.53e-01		
Eared grebe ( <i>Podiceps nigricollis</i> )	8.90e-01	0.00e+00	1.10e-01	5.00e-02	6.50e-01	N			2.92e-01		
<b>Avian carnivores (AV310)</b>											
Sharp-shinned hawk ( <i>Accipiter striatus</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	2.50e-01	N/D			1.02e-02	1.47e-01	1.01e+03
Cooper's hawk ( <i>Accipiter cooperii</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	2.50e-01	N/D			1.81e-02	5.29e-01	
Northern goshawk ( <i>Accipiter gentilis</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	2.50e-01	N/D			2.54e-02	1.14e+00	2.23e+03
Merlin ( <i>Falco columbarius</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	1.00e+00	N/D			1.22e-02	2.18e-01	
Peregrine falcon ( <i>Falco peregrinus</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	2.50e-01	N/D			2.35e-02	9.52e-01	4.07e+04
Prairie falcon ( <i>Falco mexicanus</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	1.00e+00	N/D			2.25e-02	8.63e-01	
<b>Avian carnivores (AV322)</b>											
Snowy owl ( <i>Nyctea scandiaca</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	2.50e-01	N	9.95e-02			2.28e+00	
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	2.50e-01	N	1.68e-01			5.09e+00	3.49e+03
American kestrel ( <i>Falco sparverius</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	6.50e-01	N/D			9.94e-03	1.38e-01	2.02e+02
Northern harrier ( <i>Circus cyaneus</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	1.00e+00	N/D			1.78e-02	5.13e-01	6.00e+01
Swainson's hawk ( <i>Buteo swainsoni</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	6.50e-01	N/D			2.47e-02	1.07e+00	
Red-tailed hawk ( <i>Buteo jamaicensis</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	6.50e-01	N/D			2.63e-02	1.23e+00	9.83e+02

**Table 11.** (continued)

Ferruginous hawk ( <i>Buteo regalis</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	6.50e-01	N/D		2.63e-02	1.23e+00	5.60e+02
Northern shrike ( <i>Lanius excubitor</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	2.50e-01	N/D		7.14e-03	6.56e-02	
Loggerhead shrike ( <i>Lanius ludovicianus</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	6.50e-01	N/D		6.18e-03	4.74e-02	
Great horned owl ( <i>Bubo virginianus</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	1.00e+00	N/D		3.09e-02	1.77e+00	
Long-eared owl ( <i>Asio otus</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	6.50e-01	N/D		1.36e-02	2.79e-01	
Short-eared owl ( <i>Asio flammeus</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	6.50e-01	N/D		1.56e-02	3.78e-01	
Northern saw-whet owl ( <i>Aegolius acadicus</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	2.50e-01	N/D		8.25e-03	9.08e-02	
Golden eagle ( <i>Aquila chrysaetos</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	6.50e-01	N/D		4.87e-02	4.91e+00	
Turkey vulture ( <i>Cathartes aura</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	2.50e-01	N/D		2.85e-02	1.47e+00	
Rough-legged hawk ( <i>Buteo lagopus</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	2.50e-01	N/D		2.47e-02	1.07e+00	
<b>Avian carnivores (AV322A)</b>										
Burrowing owl ( <i>Athene cunicularia</i> )	9.70e-01	0.00e+00	3.00e-02	5.00e-02	2.50e-01	P/D	2.96e-02	1.06e-02	1.59e-01	6.00e+00
<b>Avian carnivores (AV333)</b>										
Greater yellowlegs ( <i>Tringa melanoleuca</i> )	9.80e-01	0.00e+00	2.00e-02	5.00e-02	2.50e-01	N			1.71e-01	
<b>Avian carnivores (AV342) INCOMPLETE</b>										
<b>ADD SPECIES HERE</b>										
<b>Avian omnivores (AV422)</b>										
Scrub jay ( <i>Aphelocoma coerulescens</i> )	4.95e-01	4.95e-01	1.00e-02	5.00e-02	2.50e-01	P/D	1.65e-02	7.81e-03	8.02e-02	
Black-billed magpie ( <i>Pica pica</i> )	4.95e-01	4.95e-01	1.00e-02	5.00e-02	1.00e+00	P/D	3.43e-02	1.14e-02	1.89e-01	
American crow ( <i>Corvus brachyrhynchos</i> )	4.95e-01	4.95e-01	1.00e-02	5.00e-02	1.00e+00	P/D	7.27e-02	1.70e-02	4.58e-01	
Ring-necked pheasant ( <i>Phasianus colchicus</i> )	4.54e-01	4.54e-01	9.30e-02	5.00e-02	1.00e+00	N/D		2.72e-02	1.32e+00	
Common raven ( <i>Corvus corax</i> )	4.95e-01	4.95e-01	1.00e-02	5.00e-02	1.00e+00	N	6.69e-02		1.24e+00	
Herring gull ( <i>Larus argentatus</i> )	4.95e-01	4.95e-01	1.00e-02	5.00e-02	2.50e-01	N	6.65e-02		1.23e+00	
<b>Avian omnivores (AV432) - ERROR PP &amp; PV for Omnivores</b>										
American avocet ( <i>Recurvirostra americana</i> )	4.95e-01	4.95e-01	1.00e-02	5.00e-02	2.50e-01	N			3.16e-01	
Ring-billed gull ( <i>Larus delawarensis</i> )	4.95e-01	4.95e-01	1.00e-02	5.00e-02	2.50e-01	N			5.66e-01	
<b>Avian omnivores (AV433)</b>										
Great egret ( <i>Casmerodium albus</i> )	4.95e-01	4.95e-01	1.00e-02	5.00e-02	2.50e-01	N			9.35e-01	
<b>Avian omnivores (AV442)</b>										
American coot ( <i>Fulica americana</i> )	4.95e-01	4.95e-01	1.00e-02	5.00e-02	1.00e+00	N			7.24e-01	
<b>Mammalian herbivores (M121)</b>										
Porcupine ( <i>Erethizon dorsatum</i> )	0.00e+00	9.80e-01	2.00e-02	5.00e-02	2.50e-01	H			1.27e+01	
<b>Mammalian herbivores (M122)</b>										
White-tailed jackrabbit ( <i>Lepus townsendii</i> )	0.00e+00	9.37e-01	6.30e-02	5.00e-02	1.00e+00	H/D	2.61e-01	2.34e-01	4.50e+00	
Black-tailed jackrabbit ( <i>Lepus californicus</i> )	0.00e+00	9.37e-01	6.30e-02	5.00e-02	1.00e+00	H/D	2.03e-01	1.73e-01	3.18e+00	
Western harvest mouse ( <i>Reithrodontomys megalotis</i> )	0.00e+00	9.80e-01	2.00e-02	5.00e-02	1.00e+00	R/D	3.06e-03	1.78e-03	1.70e-02	
Elk ( <i>Cervus elaphus</i> )	0.00e+00	9.80e-01	2.00e-02	5.00e-02	1.00e+00	H/D	7.48e+00	1.32e+01	4.54e+02	1.62e+01
Mule deer ( <i>Odocoileus hemionus</i> )	0.00e+00	9.80e-01	2.00e-02	5.00e-02	1.00e+00	H/D	3.83e+00	5.91e+00	1.81e+02	6.07e+00

**Table 11.** (continued)

Pronghorn ( <i>Antilocapra americana</i> )	0.00e+00	9.46e-01	5.40e-02	5.00e-02	1.00e+00	H/D	1.69e+00	2.20e+00	5.85e+01	1.02e+03
<b>Small mammals/herbivores (M122A)</b>										
Nuttall's cottontail ( <i>Sylvilagus nuttallii</i> )	0.00e+00	9.80e-01	2.00e-02	n/a	1.00e+00	H/D	1.09e-01	8.22e-02	1.36e+00	1.21e+00
Pygmy rabbit ( <i>Brachylagus idahoensis</i> )	0.00e+00	9.80e-01	2.00e-02	n/a	1.00e+00	H/D	4.90e-02	3.13e-02	4.50e-01	2.51e-03
Yellow-bellied marmot ( <i>Marmota flaviventris</i> )	0.00e+00	9.80e-01	2.00e-02	n/a	1.00e+00	R/D	8.04e-02	2.36e-01	4.54e+00	
Townsend's ground squirrel ( <i>Spermophilus townsendii</i> )	0.00e+00	9.80e-01	2.00e-02	n/a	1.00e+00	R/D	1.49e-02	1.90e-02	2.55e-01	
Great basin pocket mouse ( <i>Perognathus parvus</i> )	0.00e+00	9.80e-01	2.00e-02	n/a	1.00e+00	R/D	4.09e-03	2.76e-03	2.80e-02	
Ord's kangaroo rat ( <i>Dipodomys ordii</i> )	0.00e+00	9.72e-01	2.80e-02	n/a	1.00e+00	R/D	7.12e-03	6.30e-03	7.20e-02	1.00e-01
Bushy-tailed woodrat ( <i>Neotoma cinerea</i> )	0.00e+00	9.72e-01	2.80e-02	n/a	1.00e+00	R/D	2.41e-02	3.90e-02	5.80e-01	
Montane vole ( <i>Microtus montanus</i> )	0.00e+00	9.76e-01	2.40e-02	n/a	1.00e+00	R/D	7.84e-03	7.28e-03	8.50e-02	8.00e-02
Sagebrush vole ( <i>Lagurus curtatus</i> )	0.00e+00	9.76e-01	2.40e-02	n/a	1.00e+00	R/D	4.90e-03	3.60e-03	3.80e-02	
<b>Small mammals/herbivores (M123)</b>										
Northern pocket gopher ( <i>Thomomys talpoides</i> )	0.00e+00	9.80e-01	2.00e-02	n/a	1.00e+00	R/D				1.30e-01
<b>Mammalian insectivores (M210)</b>										
Hoary bat ( <i>Lasionycteris cinereus</i> )	9.90e-01	0.00e+00	1.00e-02	5.00e-02	2.50e-01	R				2.80e-02
Silver-haired bat ( <i>Lasionycteris noctivagans</i> )	9.90e-01	0.00e+00	1.00e-02	5.00e-02	2.50e-01	R				1.10e-02
<b>Mammalian insectivores (M210A)</b>										
Small-footed myotis ( <i>Myotis leibii</i> )	9.90e-01	0.00e+00	1.00e-02	5.00e-02	1.00e+00	R/D				9.50e-03
Big-brown bat ( <i>Eptesicus fuscus</i> )	9.90e-01	0.00e+00	1.00e-02	5.00e-02	1.00e+00	R/D				1.70e-02
Townsend's big-eared bat ( <i>Plecotus townsendii</i> )	9.90e-01	0.00e+00	1.00e-02	5.00e-02	1.00e+00	R/D				1.10e-02
Little brown myotis ( <i>Myotis lucifugus</i> )	9.90e-01	0.00e+00	1.00e-02	5.00e-02	2.50e-01	R/D				9.50e-03
California myotis ( <i>Myotis californicus</i> )	9.90e-01	0.00e+00	1.00e-02	5.00e-02	2.50e-01	R/D				3.97e-02
<b>Small mammals/insectivores (M222)</b>										
Merriam's shrew ( <i>Sorex merriami</i> )	9.76e-01	0.00e+00	2.40e-02	n/a	1.00e+00	R/D				6.00e-03
Northern grasshopper mouse ( <i>Onychomys leucogaster</i> )	9.76e-01	0.00e+00	2.40e-02	n/a	1.00e+00	R/D				3.98e-02
<b>Mammalian carnivore (M322)</b>										
Long-tailed weasel ( <i>Mustela frenata</i> )	9.72e-01	0.00e+00	2.80e-02	n/a	1.00e+00	AM/D				1.50e-01
Badger ( <i>Taxidea taxus</i> )	9.72e-01	0.00e+00	2.80e-02	n/a	1.00e+00	AM/D				5.23e-01
Bobcat ( <i>Felis rufus</i> )	9.72e-01	0.00e+00	2.80e-02	5.00e-02	1.00e+00	AM/D				7.05e-01
<b>Small mammals/omnivores (M422) - PP and PS from white-footed mouse Beyer et al.</b>										
Least chipmunk ( <i>Tamias minimus</i> )	4.90e-01	4.90e-01	2.00e-02	n/a	1.00e+00	R/D	6.21e-03	5.13e-03	5.70e-02	8.36e-01
Deer mouse ( <i>Peromyscus maniculatus</i> )	4.90e-01	4.90e-01	2.00e-02	n/a	1.00e+00	R/D	3.56e-03	2.24e-03	2.20e-02	1.40e-02
Norway rat ( <i>Rattus norvegicus</i> )	4.86e-01	4.86e-01	2.80e-02	n/a	1.00e+00	R	1.58e-02		2.83e-01	9.29e-03
House mouse ( <i>Mus musculus</i> )	4.90e-01	4.90e-01	2.00e-02	n/a	1.00e+00	R	4.26e-03		3.00e-02	
Western spotted skunk ( <i>Spilogale gracilis</i> )	4.90e-01	4.90e-01	2.00e-02	n/a	1.00e+00	AM/D			4.48e-02	6.80e-01
<b>Mammalian omnivore (M422A)</b>										
Coyote ( <i>Canis latrans</i> )	9.72e-01	0.00e+00	2.80e-02	5.00e-02	1.00e+00	AM/D			8.24e-01	1.90e+01
<b>Reptiles/insectivores (R222) - PP &amp; PS from meadow vole Beyer et al.</b>										
Short-horned lizard ( <i>Phrynosoma douglassi</i> )	9.76e-01	0.00e+00	2.40e-02	n/a	1.00e+00	IR				

**Table 11.** (continued)

**Table 11.** (continued)

## BIBLIOGRAPHY

### SDA Biotic Data Compilation (EDF ER-WAG7-76)

- Abbott, M. L., L. Fraley Jr., and T. D. Reynolds, 1991, "Root Profiles Of Selected Shrubs And Grasses In Disturbed And Undisturbed Soils," *Environmental And Experimental Botany*, Vol. 31, No. 2.
- Anderson, J. E., 1986, "Development and Structure of Sagebrush Steppe Plant Communities," *Rangelands: A Resource Under Siege, Proceedings of the 2nd International Rangeland Congress*, P. J. Joss, P. W. Lynch, and O. B. Williams, eds. Australian Academy of Science, Canberra, pp. 10-12.
- Anderson, J. E., 1991, *Vegetation Studies To Support The NPR Environmental Impact Statement*, EG&G Idaho, Idaho Falls, Idaho.
- Anderson, J. E. and K. E. Holte, 1981, "Vegetation development over 25 years without grazing on sagebrush-dominated rangeland in Southeastern Idaho," *Journal of Range Management*, 34(1), pp. 25-29.
- Anderson, J. E. and R. Inouye, 1988, Long-term dynamics of vegetation in a sagebrush steppe of southeastern Idaho. Final Report, Subcontract C84-110421, Ecological Studies Program, Idaho National Engineering Laboratory. 54 p.
- Anderson, J. E. and G. E. Marlette, 1986, "Probabilities of Seedling Recruitment and the Stability of Crested Wheatgrass Stands," in *Crested Wheatgrass: its Values, Problems and Myths; Symposium Proceedings*, Utah State University, Logan UT, K. L. Johnson (ed.), pp. 97-105.
- Anderson, J. E., R. S. Nowak, T. D. Ratzlaff, and O. D. Markham, 1991, *Managing Soil Moisture on Waste Burial Sites*, DOE-ID-12123, November.
- Anderson, J. E. and M. L. Shumar, 1989, *Guidelines For Revegetation Of Disturbed Sites at The Idaho National Engineering Laboratory*, DOE/ID-12114, June 1989.
- Anderson, J. E., M. L. Shumar, N. L. Toft, and R. S. Nowak, 1987, "Control of the Soil Water Balance by Sagebrush and Three Perennial Grasses in a Cold-Desert Environment," *Arid Soil Research and Rehabilitation*, Vol. 1, pp. 229-244.
- Arthur, W. J. III, 1982, "Radionuclide Concentrations In Vegetation at a Solid Radioactive Waste-Disposal Area In Southeastern Idaho," *Journal Of Environmental Quality*, Vol. 11, No. 3., pp. 394-398.
- Arthur, W. J., III, and R. J. Gates, 1988, "Trace element intake via soil ingestion in pronghorns and in black-tailed jackrabbits," *Journal of Range Management*, Vol. 41, No. 2, pp. 162-166.
- Arthur, W. J. III and O. D. Markham, 1983, "Small Mammal Soil Burrowing As A Radionuclide Transport Vector At A Radioactive Waste Disposal Area In Southeastern Idaho," *Journal Of Environmental Quality*, Vol. 12, No. 1.

- Baes, C. F., III, R. D. Sharp, A. Sjoreen, and R. Shor, 1984, *A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides Through Agriculture*, ORNL-5786, U.S. Department of Energy, Oak Ridge National Laboratory, Oak Ridge, TN.
- Bargelt, R. J. et al., 1992, *Summary Of The RWMC Investigations Report*, EGG-WM-9708, Rev. 0, January 1992.
- Bensen, T. A., D. F. Gianotto, and J. F. Hawkins, 1994, "Technical Data Evaluation of Selected Data fro WAG 7 SDA Pits adn Trenches Risk Assessment," EG&G Idaho, Inc. Engineering Design File ER-WAG7-47, May.
- Beyer, W. N., E. E. Connor, and D. Gerould, 1994, "Estimates of Soil Ingestion by Wildlife," *Journal of Wildlife Management*, Vol. 58, No. 2, pp. 375-382.
- Binda, R. E., 1981, *Evaluation Of Final Surface Cover For The INEL Subsurface Disposal Area*, WM-F1-81-007, March 1981.
- Blom, P. E., 1990, *Potential Impacts On Radioactive Waste Disposal Situations By The Harvester Ant, Pogonomyrmex Salinus Olsen (Hymenoptera: Formicidae)*, Masters Thesis, University Of Idaho, Moscow Idaho.
- Blom, P. E., W. H. Clark, and J. B. Johnson, 1991, "Colony Densities of the Seed Harvesting Ant *Pogonomyrmex salinus* (Hymenoptera: Formicidae) in Seven Plant Communities on the Idaho National Engineering Laboratory," *Journal of the Idaho Academy of Science*, Vol. 27, No.1, June, pp. 28-36.
- Blom, P. E., J. B. Johnson, and S. K. Rope, 1991, "Concentrations of Cs-137 and Co-60 in Nests of the Harvester Ant, *Pogonomyrmex salinus*, and Associated Soils near Nuclear Reactor Waste Water Disposal Ponds," *American Midland Naturalist*, Vol. 126, pp. 140-151.
- Boone, J. D., 1990, *Ecological Characteristics and Preferential Edge Use of Small Mammal Populations Inhabiting a Radioactive Waste Disposal Area*, M.S. Thesis, Idaho State University, Pocatello, ID.
- Burt, W. H. and R. P. Grossenheider, 1980, *A Field Guide to the Mammals*, New York: Houghton-Mifflin Company.
- Connelly, J. W., H. W. Browers, R. J. Gates, 1988, "Seasonal Movements of Sage Grouse in Southeastern Idaho," *Journal of Wildlife Management*, 52(1), pp. 116-122.
- Durfee, K. J., L. D. Koeppen, and J. L. Doherty, 1991, *RML Gamma-Ray Analysis RWMC Crested Wheat Grass Collected 07/18/91 To 07/24/91*, ST-PHY-91-049, October 1991.
- Durfee, K. J., L. D. Koeppen, J. L. Doherty, and G. K. Taylor, 1990, *RML Gamma-Ray Samples Collected 10/01/90 By Environmental Monitoring Program (EMP)*, ST-CS-052-90, December 1990.
- Dunning, J. P., 1993, CRC Handbook of Avian Body Masses, BocaRaton, FL: CRC Press.
- French, N. R. and J. E. Mitchell, 1983, "Long-Term Vegetation Changes in Permanent Quadrats at the INEL Site," Contribution 256, the Forest, Wildlife, and Range Experiment Station, University of Idaho, Moscow, November.

- Groves, C. R. and B. L. Keller, 1986, "Movements by Small Mammals on a Radioactive Waste Disposal Area in Southeastern Idaho," *Great Basin Naturalist*, 46(3), July, pp. 404-410.
- Hoover, R. L. and D. L. Wills, eds., 1987, *Managing Forested Lands for Wildlife*, Developed in cooperation with the U.S. Department of Agriculture, Forest Service, Rocky Mountain Region, Colorado Division of Wildlife.
- Howe, F. P. and L. D. Flake, 1988, "Mourning Dove Movements During the Reproductive Season in Southeastern Idaho," *Journal of Wildlife Management*, 52(3), pp. 477-480.
- Janke, D. H. and W. J. Arthur, 1985, "Radionuclide Transport by Cottontail Rabbits at a Radioactive Waste Disposal Area," *Northwest Sciences*, Vol. 59, No. 3, pp. 221-229.
- Johnson, R. D. and J. E. Anderson, 1984, "Diets of Black-Tailed Jackrabbits in Relation to Population Density and Vegetation," *Journal of Rangement Management*, Vol. 37, No. 1, pp. 79-83.
- Knick, S. T., 1986, "Long-distance movements by Two Bobcats from Southeastern Idaho," *American Midland Naturalist.*, pp. 222-223.
- Knick, S. T., 1990, "Ecology of Bobcats Relative to Exploitation and a Prey Decline in Southeastern Idaho," *Wildlife Monographs*, No. 108, April, Supplement to *Journal of Wildlife Management*, Vol. 54, No. 2.
- Koehler, D. K., 1988, *Small Mammal Movement Patterns Around a Radioactive Waste Disposal Area in Southeastern Idaho*, M.S. Thesis, University of Wyoming, Laramie, WY.
- Laundre', J. W., 1979 *A Behavioural Study of Home Range Utilization by Coyotes on the INEL Site in Southeastern Idaho*, Ph.D. dissertation, Idaho State University, Pocatello, ID.
- Laundre', J. W., 1989a, "Burrows Of Least Chipmunks In Southeastern Idaho," *Northwestern Naturalist* , Vol. 70, No. 1.
- Laundre', J. W., 1989b, "Horizontal And Vertical Diameter Of Burrows Of Five Small Mammal Species In Southeastern Idaho," *Great Basin Naturalist* , Vol. 49.
- Laundre', J. W., 1990, "Soil Moisture Patterns Below the Mounds of Harvester Ants," *Journal of Range Management*, Vol. 43, No. 1.
- Laundre', J. W. and B. L. Keller, 1981, "Home-Range Use by Coyotes in Idaho," *Animal Behavior*, Vol. 29, pp. 449-461.
- MacCracken, J. G. and R. M. Hansen, 1982, "Herbaceous Vegetation of Habitat Used by Blacktail Jackrabbits and Nuttall Cottontails in Southeastern Idaho," *American Midland Naturalist*, Vol. 107, No.1, pp. 180-184.
- MacCracken, J. G. and R. M. Hansen, 1984, "Seasonal Foods of Blacktail Jackrabbits and Nuttall Cottontails in Southeastern Idaho," *Journal of Range Management*, Vol. 37, No. 3, pp. 256-259.
- Marlette, G. M. and J. E. Anderson, 1986, "Seed Banks and Propagule Dispersal in Crested-Wheatgrass Stands," *Journal of Applied Ecology*, 23, pp. 161-175.

- Millard, G. C., L. Fraley Jr., and O. D. Markham, 1983, "Deposition And Retention Of 141-Ce And 134-Cs Aerosols On Cool Desert Vegetation," *Health Physics*, Vol. 44, No. 4.
- Mullican, T. R. and B. L. Keller, 1987, "Burrows of the Sagebrush Vole (*Lemmiscus curtatus*) in Southeastern Idaho, *Great Basin Naturalist*, Vol. 47, No. 2, pp. 276-279.
- Reyes, B. D., M. J. Case, and R. N. Wilhelmsen, 1986, *Annual Report-1985 Environmental Monitoring For EG&G Idaho Facilities At The Idaho National Engineering Laboratory*, EGG-2451, August 1986.
- Reyes, B. D., J. W. Tkachyk, P. D. Ritter, and R. N. Wilhelmsen, 1987, *Annual Report-1986 Environmental Monitoring For EG&G Idaho Facilities At The Idaho National Engineering Laboratory*, EGG-2502, August 1987.
- Reynolds, T. D., 1990a, "Root Mass And Vertical Root Distribution Of Five Semi-Arid Plant Species," *Health Physics*, Vol. 58, No. 2.
- Reynolds, T. D., 1990b, "Effectiveness Of Three Natural Biobarriers In Reducing Root Intrusion By Four Semi-Arid Plant Species," *Health Physics*, Vol. 59, No. 6.
- Reynolds, T. D. and L. Fraley Jr., 1989, "Root Profiles Of Some Native And Exotic Plant Species In Southeastern Idaho," *Environmental And Experimental Botany*, Vol. 29, No. 2.
- Reynolds, T. D. and J. W. Laundre', 1988, "Vertical Distribution Of Soil Removed By Four Species Of Burrowing Rodents In Disturbed And Undisturbed Soils," *Health Physics*, Vol. 54, No. 4.
- Reynolds, T. D. and T. D. Rich, 1978, "Reproductive Ecology of the Sage Thrasher (*Oreoscoptes montanus*) on the Snake River Plain in South-central Idaho, *Auk*, Vol. 95, July, pp. 580-583.
- Reynolds, T. D. and W. L. Wakkinen, 1987, "Characteristics Of The Burrows Of Four Species Of Rodents In Undisturbed Soils In Southeastern Idaho," *American Midland Naturalist*, Vol. 118, No. 2.
- Shumar, M. L. and J. E. Anderson, 1986, "Gradient Analysis of Vegetation Dominated by Two Subspecies of Big Sagebrush," *Journal of Range Management*, Vol. 39, No. 2, pp. 156-160.
- Sorensen, T. C. and L. D. Koeppen, 1992, *Radiation Measurements Laboratory Analysis Of RWMC Russian Thistle Samples Collected 7/23/92*, RML-B7A0-92-014, September 1992.
- Tkachyk, J. W., P. D. Ritter, and R. N. Wilhelmsen, 1988, *Annual Report-1987 Environmental Monitoring For EG&G Idaho Facilities At The Idaho National Engineering Laboratory*, EGG-2550, August 1988.
- Travis, C. C. and A. D. Arms, 1988, "Bioconcentration of organics in beef, milk, and vegetation," *Environmental Science and Technology*, Vol. 22, pp. 271-274.
- VanHorn, R. L., 1995, *Guidance Manual for Conducting Screening Level Ecological Risk Assessments at the INEL, Appendix C: Ecological Literature and Data Evaluation*, INEL-95/0190, April 1995.

- Watson, J. W., 1984, *Rough-Legged Hawk Winter Ecology in Southeastern Idaho*, M.S. Thesis, Montana State University, Bozeman, MT.
- Watson, J. W., 1986, "Range Use by Wintering Rough-Legged Hawks in Southeastern Idaho," *The Condor*, Vol. 88, pp. 256-258.
- Woodruff, R. A., 1977, *Annual Dispersal, Daily Activity Pattern and Home Range of Canis latrans on the Idaho National Engineering Laboratory Site*, M.S. Thesis, Idaho State University, Pocatello, ID.
- Woodruff, R. A. and B. L. Keller, 1982, "Dispersal, Daily Activity, and Home Range of Coyotes in Southeastern Idaho," *Northwest Science*, Vol. 56, No. 3, pp. 199-206.



---

## INTERDEPARTMENTAL COMMUNICATION

---

Date: March 3, 1995

To: Distribution *NH*

From: N. L. Hampton, MS 2213

Subject: COMPIRATION OF SITE SPECIFIC BIOTIC DATA FOR WAG-7 RISK ASSESSMENT  
- NLH-01-95

There have been several past efforts to identify and compile site specific biotic data for the INEL/SDA into a useable form. I have reviewed the status and results of these efforts and defined three basic tasks to 1) organize, 2) compile and 3) document the most readily available INEL biotic input values.

These estimates do not consider the time that may be required for in-depth data interpretation or to search, locate and transform INEL or other supporting data (for example, developing bioaccumulation factors or distribution of burrows with depth). That sort of detail was included in the original estimate for this task (Fall 1994). If a usable value can't be easily extracted (less than 1 hour), increased scope and/or separate funding will be required. Input values developed separate from this effort should be well documented and can be added to the summary tables at a later date.

Task 1 - Review and combine previous efforts (56 hours total):

- E&E SLERA literature summary
- Technical Data Evaluation EDF
- ERIS Bibliography
- Information compiled for ERA to date

- Subtasks:
- 1) Construct and complete summary table(s) for INEL/WAG7 biotic parameters (similar to EDF table, example Format A attached). 24 hrs
  - 2) Identify and review recent ('93-'94), unreviewed material (approximately 10 documents). 16 hrs + \$ for copies etc. Lead time required for library to find, request and forward material.
  - 3) Compile annotated bibliography listing INEL/SDA/Outside biotic data sources for risk assessment (to date from existing bibliographical files). 16hrs

The summary and bibliography resulting from Task 1 would be the starting point for other projects if INEL biotic data are required for risk modeling or other purposes.

Distribution  
March 3, 1995  
NLH-01-95  
Page 2

**Task 2 -** Compile HRA and ERA input data values from sources identified in Task 1 (120 hours total).

- Subtasks:
- 1) Design and setup summary tables (16 hrs).
  - 2) Extract/document model input for HRA (40 hrs).
  - 3) Extract/document model input for ERA (40 hrs) we have some information compiled.
  - 4) Cross-check/combine HRA/ERA/verify all values (24 hrs).

I envision completing a summary table for each model parameter to document the input values and sources from which they were obtained (example Format B attached).

**Task 3 -** Compile summary document (EDF, internal report) - This task is optional (40-80hrs) requires lead time, text processing, review, printing etc.

Please feel free to add suggestions or comments with regard to this estimate. Once it has been finalized, we can get together to assign tasks and subtasks.

Attachments:

Distribution

B. H. Becker, MS 3960  
D. E. Burns, MS 3960  
R. M. Huntley, MS 3920  
S. O. Magnuson, MS 2110  
S. M. Rood, MS 3960  
R. L. Van Horn, MS 3960

cc: N. L. Hampton File

## FORMAT A

PARAMETER	MODIFYING INFORMATION	SOURCES			Supporting Data Requirements	COMMENTS
		SDA/RWMC	INEL	OTHER		
Insect and Animal Burrowing Depth		(references)	(references)	(references)	(Data description/known references)	
Insect and Animal Burrowing Densities						
Insect and Animal Burrow Volumes						
Plant Root Depth						
Plant Root Density						
Mass of Plant Shoots						
Fraction Plant Cover						
Length of Growing Season and Variability Over Time						
Plant Average Life Span						
Plant Uptake Coefficients						
ERA - Body weights, BAFs, Home ranges, TRVs, Etc.						

**FORMAT B - EXAMPLE SUMMARY FOR PLANT ROOT DEPTH and MASS - WAG 7**

SPECIES	Root Depth (min)	Root Depth (max)	Root Depth (avg)	Root Mass	SOURCES	COMMENTS
ARTR		(depth and soil conditions)		(depth and density)	(reference title and pages)	(SDA specific or not, etc.)
BRCR						
LECE						
etc.						